

REMARKS

New claims 57-65 have been added. Support for the amendment can be found, for example, at page 9, lines 1-5. Claims 1, 14, 23, 30, 38, 43, 48, 49, 53, and 57 are independent. No new matter has been added.

Obviousness-Type Double Patenting Rejections

Claims 1, 4-11, and 14-56 have been rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-31 of U.S. Patent No. 6,322,901 ("the '901 patent") in view of Hakimi et al., U.S. Patent No. 5,260,957 ("Hakimi"). See page 2 of the action mailed April 8, 2003 ("Office Action").

Applicants have discovered a gain medium, a laser, a method of amplifying an optical signal, and a method of forming a laser, all of which include a concentrated solid including a plurality of semiconductor nanocrystals. In the concentrated solid, **the plurality of semiconductor nanocrystals are close-packed**. See claims 1, 14, 23, 30, 38, 43, 48, 49 and 53. Close-packed nanocrystals are an example of a concentrated solid. See page 2, lines 11-12 of the specification. Close-packed refers to an arrangement of objects that maximizes the number of objects that can fit into a given volume.

Neither claims 1-31 of the '901 patent nor Hakimi teach, suggest or motivate a person skilled in the art to form a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed. Neither reference teaches, suggests or motivates one skilled in the art to form a concentrated solid including a plurality of semiconductor nanocrystals in which the nanocrystals are close-packed.

Claims 1-31 of the '901 patent are directed to a coated semiconductor nanocrystal capable of light emission. See, for example, claims 1 and 10 of the '901 patent. These claims do not teach or suggest a concentrated solid including a plurality of semiconductor nanocrystals in which the nanocrystals are close-packed, or indeed any kind of close-packed semiconductor nanocrystals. Hakimi does not cure this deficiency.

Hakimi describes a "laser host material which is typically low-loss, striae free and optically clear. Disposed in this laser host material are a plurality of quantum dots." See Hakimi

at column 2, lines 41-45. Nothing in Hakimi suggests or motivates one skilled in the art to make a concentrated solid including a plurality of semiconductor nanocrystals, **the plurality of semiconductor nanocrystals being close-packed**. As a result, claims 1-31 of the '901 patent in combination with Hakimi fails to teach, suggest or motivate one skilled in the art to use a concentrated solid including close-packed semiconductor nanocrystals.

For at least this reason, independent claims 1, 14, 23, 30, 38, 43, 48, 49 and 53 and the claims that depend from them are patentable over claims 1-31 of the '901 patent in view of Hakimi. Applicants respectfully request reconsideration and withdrawal of this rejection.

Rejection Under 35 U.S.C. § 102(b)

Claims 1, 4-5, 9-12, 14-17, 21-25, 28-34, 37-39, 42-44, 47-50 and 53-54 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Hakimi. See pages 3-5 of the Office Action. Claims 1, 14, 23, 30, 38, 43, 48, 49, and 53 are independent.

Applicants have discovered a gain medium, a laser, a method of amplifying an optical signal, and a method of forming a laser that includes a concentrated solid including a plurality of semiconductor nanocrystals, **the plurality of semiconductor nanocrystals being close-packed**. See independent claims 1, 14, 23, 30, 38, 43, 48, 49 and 53. Close-packed nanocrystals are an example of a concentrated solid. See page 2, lines 11-12 of the specification. Close-packed refers to an arrangement of objects that maximizes the number of objects that can fit into a given volume. Close-packed nanocrystals can occupy a high volume fraction of a concentrated solid. The specification at page 9, lines 2-4 states that "[t]he close-packed nanocrystals can form a concentrated solid including greater than 0.2%, greater than 10%, greater than 15%, between 16% and 67%, or between 18% and 20% by volume, semiconductor nanocrystals."

The Examiner states that "Hakimi discloses a gain medium 12 comprising a concentrated solid including a plurality of semiconductor nanocrystals 14 wherein the solid is [sic] substantially free of defects." See Office Action at page 3. Hakimi does not describe close-packed nanocrystals. As described above, Hakimi discloses a "laser host material which is typically low-loss, striae free and optically clear. Disposed in this laser host material are a plurality of quantum dots." See Hakimi at column 2, lines 41-45. Hakimi only refers to the quantum dots as being "disposed" in a laser host material, "such as PMMA or any other suitable

low-loss striae free optically clear material.” See Hakimi at column 3, lines 32-34. Quantum dots disposed in PMMA are not close-packed semiconductor nanocrystals. Hakimi does not disclose a concentrated solid including a plurality of semiconductor nanocrystals, **the plurality of semiconductor nanocrystals being close-packed**. Thus, independent claims 1, 14, 23, 30, 38, 43, 48, 49 and 53 and the claims that depend from them are not anticipated by Hakimi. Applicants respectfully request reconsideration and withdrawal of this rejection.

Rejection Under 35 U.S.C. § 103(a)

Claims 2-3 and 13 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Hakimi. See Office Action at page 5. Claims 2-3 and 13 depend from independent claim 1.

As discussed above, Applicants have discovered a gain medium that includes a concentrated solid including a plurality of semiconductor nanocrystals, **the plurality of semiconductor nanocrystals being close-packed**. See independent claim 1. Hakimi does not teach or suggest a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed. Nothing in Hakimi suggests or motivates a person of skill in the art to use close-packed semiconductor nanocrystals in a gain medium. As a result, Hakimi fails to teach, suggest or motivate one skilled in the art to use a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed in a gain medium. Indeed, there is no motivation provided in Hakimi to form a solid including close-packed semiconductor nanocrystals.

For at least this reason, claim 1 and claims 2, 3 and 13 that depend from it are patentable over Hakimi. Applicants respectfully request reconsideration and withdrawal of this rejection.

New Claims 57-65

Claims 57-65 have been added. Independent claim 57 is directed to a gain medium comprising a film of close-packed semiconductor nanocrystals. None of the cited references describes a gain medium comprising a film of close-packed semiconductor nanocrystals. The new claims are patentable over the cited references.

Applicant : Victor I. Klimov et al.
Serial No. : 09/805,435
Filed : March 14, 2001
Page : 14 of 14

Attorney's Docket No.: 01997-297001 / MIT Case 8763

CONCLUSION

Applicants ask that all claims be allowed in view of the amendments to the claims and remarks contained in this reply.

Enclosed is a \$246.00 check for excess claim fees. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: _____

8-8-03



Harold H. Fox
Reg. No. 41,498

Fish & Richardson P.C.
1425 K Street, N.W.
11th Floor
Washington, DC 20005-3500
Telephone: (202) 783-5070
Facsimile: (202) 783-2331